#### WE CLAIM:

1. A (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2$  and  $R^2$  are independently H,  $C_{1-4}$  alkyl,  $C_{1-4}$  alkenyl,  $C_{1-4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I,  $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  alkynyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$  alkynyl),  $O(C_{1-4}$ 

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 $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH(C_{1-4} \text{ alkenyl})$ ,  $NH(C_{1-4} \text{ alkenyl})$ ,  $NH(C_{1-4} \text{ alkenyl})$ ,  $NH(C_{1-4} \text{ acyl})$ ,  $N(C_{1-4} \text{ alkyl})$ ,  $N(C_{1-4} \text{ alkyl})$ ,  $N(C_{1-18} \text{ acyl})_2$ , wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by  $N_3$ , CN, one to three halogen (Cl, Br, F, I),  $NO_2$ ,  $C(O)O(C_{1-4} \text{ alkyl})$ ,  $C(O)O(C_{1-4} \text{ alkyl})$ ,  $C(O)O(C_{1-4} \text{ alkynyl})$ ,  $C(O)O(C_{1-4} \text{ alkynyl})$ ,  $C(O)O(C_{1-4} \text{ alkenyl})$ ,  $C(O)O(C_{1-4$ 

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof.

2. The (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D or  $\beta$ -L) of claim 1 or its pharmaceutically acceptable salt or prodrug thereof, wherein Base is selected from the group consisting of:

wherein

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## Y is N or CH.

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

3. The (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D) of claim 1 or its pharmaceutically acceptable salt or prodrug thereof,

wherein Base is selected from the group consisting of (a) or (b):

and wherein R<sup>1</sup> is H, R<sup>2</sup> is OH, R<sup>2</sup> is H, R<sup>3</sup> is H, and R<sup>4</sup> is NH<sub>2</sub> or OH, and R<sup>5</sup> is NH<sub>2</sub>.

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# 4. A (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or $\beta$ -L) of the formula:

wherein

Base is selected from the group consisting of

Y is N or CH;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

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 $R^2$  and  $R^{2'}$  are independently H,  $C_{1-4}$  alkyl,  $C_{1-4}$  alkenyl,  $C_{1-4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I, NO<sub>2</sub>, C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$ 4 alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  acyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$ alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkenyl})$ alkyl),  $NH(C_{1-4}$  alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$ alkyl)2, N(C<sub>1-18</sub> acyl)2, wherein alkyl, alkynyl, alkenyl and vinyl are optimally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4} \text{ alkyl}), NH(C_{1-4}$ alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$  alkyl)<sub>2</sub>,  $N(C_{1-4}$ acyl)2, OR7; R2 and R2 can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

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Br, I) lower alkyl of  $C_1$ - $C_6$  such as  $CF_3$  and  $CH_2CH_2F$ , lower alkenyl of  $C_2$ - $C_6$  such as  $CH=CH_2$ , halogenated (F, Cl, Br, I) lower alkenyl of  $C_2$ - $C_6$  such as C=CH-Chel, CH=CHBr and CH=CHI, lower alkynyl of  $C_2$ - $C_6$  such as C=CH, halogenated (F, Cl, Br, I) lower alkynyl of  $C_2$ - $C_6$ , lower alkoxy of  $C_1$ - $C_6$  such as  $CH_2OH$  and  $CH_2CH_2OH$ , halogenated (F, Cl, Br, I) lower alkoxy of  $C_1$ - $C_6$ ,  $CO_2H$ ,  $CO_2R$ ',  $CONH_2$ , CONHR',

CONR'2, CH=CHCO2H, CH=CHCO2R';

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R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR',

SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl,

 $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl;

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof.

5. The (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside (β-D) of claim 4 or its pharmaceutically acceptable salt or prodrug thereof, wherein

Base is

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and R<sup>1</sup> is H, R<sup>2</sup> is OH, R<sup>2</sup> is H, R<sup>3</sup> is H, R<sup>4</sup> is NH<sub>2</sub> or OH, and R<sup>6</sup> is H.

6. A (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D or  $\beta$ -L) or its pharmaceutically acceptable salt or prodrug thereof of the structure:

wherein Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and,

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group.

7. The (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D or  $\beta$ -L) of claim 6 or its pharmaceutically acceptable salt or prodrug thereof,

wherein Base is selected from the group consisting of:

Y is N or CH;

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R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl,

Br, I) lower alkyl of  $C_1$ - $C_6$  such as  $CF_3$  and  $CH_2CH_2F$ , lower alkenyl of  $C_2$ - $C_6$  such as  $CH=CH_2$ , halogenated (F, Cl, Br, I) lower alkenyl of  $C_2$ - $C_6$  such as C=CH-ChCl, CH=CHBr and CH=CHI, lower alkynyl of  $C_2$ - $C_6$  such as C=CH, halogenated (F, Cl, Br, I) lower alkynyl of  $C_2$ - $C_6$ , lower alkoxy of  $C_1$ - $C_6$  such as  $CH_2OH$  and  $CH_2CH_2OH$ , halogenated (F, Cl, Br, I) lower alkoxy of  $C_1$ - $C_6$ ,  $CO_2H$ ,  $CO_2R$ ',  $CONH_2$ , CONHR', CONR'<sub>2</sub>,  $CH=CHCO_2H$ ,  $CH=CHCO_2R$ '; and,

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

8. The (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D) of claim 6 or its pharmaceutically acceptable salt or prodrug thereof,

wherein Base is selected from the group consisting of (a) or (b):

and wherein  $R^1$  and  $R^7$  are H,  $R^3$  is H, and  $R^4$  is  $NH_2$  or OH, and  $R^5$  is  $NH_2$ .

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## 9. A (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or $\beta$ -L) of the formula:

$$R^{1}O$$
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{3}$ 

wherein Base is

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X is O, S,  $CH_2$ , Se, NH, N-alkyl, CHW (R, S, or racemic),  $C(W)_2$ , wherein W is F, Cl, Br, or I;

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2$  and  $R^2$  are independently H,  $C_{1-4}$  alkyl,  $C_{1-4}$  alkenyl,  $C_{1-4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I,  $NO_2$  C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$  alkyl), O( $C_{1-4}$  alkyl)

alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl}), O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4})$ alkyl),  $NH(C_{1-4}$  alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$ alkyl)<sub>2</sub>, N(C<sub>1-18</sub> acyl)<sub>2</sub>, wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_2$  C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl}), SO_2(C_{1-4} \text{ alkynyl}), SO_2(C_{1-4} \text{ alkenyl}), O_3S(C_{1-4} \text{ acyl}),$  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkyl})$ alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$  alkyl)<sub>2</sub>,  $N(C_{1-4}$ acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2</sup> can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

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R<sup>3</sup> and R<sup>4</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl.

- R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;
- or its pharmaceutically acceptable salt or prodrug thereof.
  - 10. A (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D or  $\beta$ -L) of the formula

wherein Base is

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in* 

*vivo* is capable of providing a compound wherein  $R^1$  is H or phosphate;  $R^2$  is H or phosphate;  $R^1$  and  $R^2$  or  $R^7$  can also be linked with cyclic phosphate group;

R<sup>3</sup> and R<sup>4</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl;

or its pharmaceutically acceptable salt or prodrug thereof.

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11. A (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside (β-D) or its
 20 pharmaceutically acceptable salt or prodrug thereof of the formula:

12. A (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

$$R^{1}O$$
 $R^{7}O$ 
 $R$ 

wherein

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group; and,

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro.

13. A (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

14. A (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

$$R^{1}O$$
 $X$ 
 $CH_{3}$ 
 $CH_{3}$ 

wherein

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X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and

R<sup>1</sup> is H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other

pharmaceutically acceptable leaving group which when administered *in* vivo is capable of providing a compound wherein R<sup>1</sup> is H or phosphate.

15. A (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside (β-D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

$$HO \longrightarrow CH_3$$

16. A pharmaceutical composition comprising a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

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wherein

Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives,

sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

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R<sup>2</sup> and R<sup>2</sup> are independently H, C<sub>1-4</sub> alkyl, C<sub>1-4</sub> alkenyl, C<sub>1-4</sub> alkynyl, vinyl, N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub> C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$ 4 alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  acyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$ alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl}), O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4})$ alkyl),  $NH(C_{1-4}$  alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$ alkyl)<sub>2</sub>, N(C<sub>1-18</sub> acyl)<sub>2</sub>, wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_2$  C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkyl})$ alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$  alkyl)<sub>2</sub>,  $N(C_{1-4}$ acyl)2, OR7; R2 and R2 can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F),

azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, a pharmaceutically acceptable carrier.

17. The composition of claim 16, wherein Base is selected from the group consisting of:

wherein

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Y is N or CH.

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl.

# 18. The composition of claim 16, wherein

Base is selected from the group consisting of (a) or (b):

and wherein  $R^1$  is H,  $R^2$  is OH,  $R^2$ ' is H,  $R^3$  is H, and  $R^4$  is  $NH_2$  or OH, and  $R^5$  is  $NH_2$ .

# 19. A pharmaceutical composition comprising a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or $\beta$ -L) of the formula:

wherein

Base is selected from the group consisting of

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#### Y is N or CH;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

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R<sup>2</sup> and R<sup>2</sup> are independently H, C<sub>1-4</sub> alkyl, C<sub>1-4</sub> alkenyl, C<sub>1-4</sub> alkynyl, vinyl, N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>, C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1</sub>. 4 alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  acyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$ alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl}), O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4})$ alkyl),  $NH(C_{1-4}$  alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$ alkyl)<sub>2</sub>, N(C<sub>1-18</sub> acyl)<sub>2</sub>, wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkyl})$ 

alkenyl), NH( $C_{1-4}$  alkynyl), NH( $C_{1-4}$  acyl), N( $C_{1-4}$  alkyl)<sub>2</sub>, N( $C_{1-4}$  acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2</sup>, can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl;

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof in a pharmaceutically acceptable carrier.

20. The composition of claim 19, wherein

Base is

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and  $R^1$  is H,  $R^2$  is OH,  $R^2$  is H,  $R^3$  is H,  $R^4$  is NH $_2$  or OH, and  $R^6$  is H.

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21. A pharmaceutical composition comprising a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) or its pharmaceutically acceptable salt or prodrug thereof, in a pharmaceutically acceptable carrier, of the structure:

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wherein Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and,

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically

acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein  $R^1$  or  $R^7$  is independently H or phosphate;  $R^1$  and  $R^7$  can also be linked with cyclic phosphate group.

## 22. The composition of claim 21, wherein

Base is selected from the group consisting of:

Y is N or CH;

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R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

# 23. The composition of claim 21, wherein

Base is selected from the group consisting of (a) or (b):

and wherein  $R^1$  and  $R^7$  are H,  $R^3$  is H, and  $R^4$  is  $NH_2$  or OH, and  $R^5$  is  $NH_2$ .

24. A pharmaceutical composition comprising a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

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Base is

X is O, S,  $CH_2$ , Se, NH, N-alkyl, CHW (R, S, or racemic),  $C(W)_2$ , wherein W is F, Cl, Br, or I;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-

phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

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 $R^2$  and  $R^2$  are independently H,  $C_{1\text{--}4}$  alkyl,  $C_{1\text{--}4}$  alkenyl,  $C_{1\text{--}4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I, NO<sub>2</sub>, C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> 4 alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  acyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$ alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl}), O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4})$ alkyl),  $NH(C_{1-4}$  alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$ alkyl)2, N(C<sub>1-18</sub> acyl)2, wherein alkyl, alkynyl, alkenyl and vinyl are optimally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4} \text{ alkyl}), NH(C_{1-4}$ alkenyl), NH( $C_{1-4}$  alkynyl), NH( $C_{1-4}$  acyl), N( $C_{1-4}$  alkyl)<sub>2</sub>, N( $C_{1-4}$ acyl)2, OR7; R2 and R2 can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

R³ and R⁴ are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

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R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl; and

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof and a pharmaceutically acceptable carrier.

25. A pharmaceutical composition comprising a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

Base is

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group;

R<sup>3</sup> and R<sup>4</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

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R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ ,

optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl;

or its pharmaceutically acceptable salt or prodrug thereof, in a pharmaceutically acceptable carrier.

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26. A pharmaceutical composition comprising a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside (β-D) or its pharmaceutically acceptable salt or prodrug thereof, in a pharmaceutically acceptable carrier of the formula:

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27. A pharmaceutical composition comprising a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L), or its pharmaceutically acceptable salt or prodrug thereof, in a pharmaceutically acceptable carrier, of the formula:

$$R^{1}O$$
 $R^{6}$ 
 $R^{7}O$ 
 $E$ 
 $CH_{3}$ 

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wherein

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-

phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group; and,

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro.

28. A pharmaceutical composition comprising a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof, in a pharmaceutically acceptable carrier, of the formula:

29. A pharmaceutical composition comprising a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside (β-D) or its pharmaceutically acceptable salt or prodrug thereof in a pharmaceutically acceptable carrier of the formula:

$$R^{1}O$$
 $X$ 
 $CH_{3}$ 
 $CH_{3}$ 

wherein

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X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and

R<sup>1</sup> is H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate;

30. A pharmaceutical composition comprising a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside (β-D) or its pharmaceutically acceptable salt or prodrug thereof, in a pharmaceutically acceptable carrier, of the structure:

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31. A method for the treatment or prophylaxis of hepatitis C infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

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wherein

Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives,

sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

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 $R^2$  and  $R^2$  are independently H,  $C_{1-4}$  alkyl,  $C_{1-4}$  alkenyl,  $C_{1-4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I, NO<sub>2</sub>, C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1}$ . 4 alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  acyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$ alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl}), O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH<sub>2</sub>, NH(C<sub>1-4</sub>$ alkyl),  $NH(C_{1-4}$  alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$ alkyl)<sub>2</sub>, N(C<sub>1-18</sub> acyl)<sub>2</sub>, wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_{2.}$   $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkyl})$ alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$  alkyl)<sub>2</sub>,  $N(C_{1-4}$ acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2</sup> can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F),

azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

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## 32. The method of claim 31,

wherein Base is selected from the group consisting of:

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Y is N or CH.

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R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-

 $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

#### 33. The method of claim 31, wherein

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Base is selected from the group consisting of (a) or (b):

and wherein  $R^1$  is H,  $R^2$  is OH,  $R^2$  is H,  $R^3$  is H, and  $R^4$  is NH<sub>2</sub> or OH, and  $R^5$  is NH<sub>2</sub>.

34. A method for the treatment or prophylaxis of hepatitis C infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

Base is selected from the group consisting of

Y is N or CH;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2$  and  $R^2$  are independently H,  $C_{1-4}$  alkyl,  $C_{1-4}$  alkenyl,  $C_{1-4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I,  $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4$ 

 $NO_{2}$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkyl})$ alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$  alkyl)<sub>2</sub>,  $N(C_{1-4}$ acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2</sup> can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

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- R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C2-C6 such as CH=CH2, halogenated (F, Cl, Br, I) lower alkenyl of C2-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'2, CH=CHCO2H, CH=CHCO2R';
- R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>- $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl;
- R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

#### 35. The method of claim 34, wherein

Base is

and  $R^1$  is H,  $R^2$  is OH,  $R^2$  is H,  $R^3$  is H,  $R^4$  is NH  $\!_2$  or OH, and  $R^6$  is H.

36. A method for the treatment or prophylaxis of hepatitis C infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) or its pharmaceutically acceptable salt or prodrug thereof of the structure:

wherein Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and,

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives,

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sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group;

optionally, in a pharmaceutically acceptable carrier.

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#### 37. The method of claim 36, wherein

Base is selected from the group consisting of:

Y is N or CH;

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

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## 38. The method of claim 36, wherein

Base is selected from the group consisting of (a) or (b):

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and wherein  $R^1$  and  $R^7$  are H,  $R^3$  is H, and  $R^4$  is  $NH_2$  or OH, and  $R^5$  is  $NH_2$ .

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39. A method for the treatment or prophylaxis of hepatitis C infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

Base is

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2$  and  $R^2$  are independently H,  $C_{1-4}$  alkyl,  $C_{1-4}$  alkenyl,  $C_{1-4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I,  $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $C(C_{1-4}$  alkenyl),  $C(C_{1-4}$  alkenyl),  $C(C_{1-4}$  alkynyl),  $C(C_{1-4}$  a

 $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkyl})$ alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$  alkyl)<sub>2</sub>,  $N(C_{1-4}$ acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2</sup> can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

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R<sup>3</sup> and R<sup>4</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C2-C6 such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'2, CH=CHCO2H, CH=CHCO2R';

R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl; and,

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier

40. A method for the treatment or prophylaxis of hepatitis C infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta-D \text{ or } \beta-L)$  of the formula:

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wherein

Base is

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group;

R<sup>3</sup> and R<sup>4</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I)

lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C=CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier

41. A method for the treatment or prophylaxis of hepatitis C infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

optionally in a pharmaceutically acceptable carrier.

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42. A method for the treatment or prophylaxis of hepatitis C infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

$$R^{1}O$$
 $R^{6}$ 
 $R^{7}O$ 
 $E$ 
 $CH_{3}$ 

wherein

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group; and,

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

optionally in a pharmaceutically acceptable carrier.

43. A method for the treatment or prophylaxis of hepatitis C infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

optionally in a pharmaceutically acceptable carrier.

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44. A method for the treatment or prophylaxis of hepatitis C infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

wherein

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and

R<sup>1</sup> is H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-

phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate;

optionally in a pharmaceutically acceptable carrier.

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45. A method for the treatment or prophylaxis of hepatitis C infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

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optionally in a pharmaceutically acceptable carrier.

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46. A method for the treatment or prophylaxis of a rhinovirus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

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Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2 \text{ and } R^{2'} \text{ are independently H, } C_{1-4} \text{ alkyl, } C_{1-4} \text{ alkenyl, } C_{1-4} \text{ alkynyl, vinyl, } N_3, \\ CN, Cl, Br, F, I, NO_2, C(O)O(C_{1-4} \text{ alkyl), } C(O)O(C_{1-4} \text{ alkyl), } C(O)O(C_{1-4} \text{ alkyl), } C(O)O(C_{1-4} \text{ alkyl), } O(C_{1-4} \text{ alkynyl}), S(C_{1-4} \text{ alkenyl), } SO(C_{1-4} \text{ alkynyl}), SO(C_{1-4} \text{ alkynyl}), SO(C_{1-4} \text{ alkenyl}), SO(C_{1-4} \text{ alkynyl}), SO_2(C_{1-4} \text{ alkenyl}), SO_2(C_{1-4} \text{ alkynyl}), SO_2(C_{1-4} \text{ alkenyl}), O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkynyl}), O_3S(C_{1-4} \text{ alkenyl}), NH(C_{1-4} \text{ alkynyl}), NH(C_{1-4} \text{ alkenyl}), NH(C_{1-4} \text{ alkenyl}), NH(C_{1-4} \text{ alkynyl}), NH(C_{1-4} \text{ acyl}), N(C_{1-4} \text{ acyl}), N(C_{1-4} \text{ alkynyl}), NH(C_{1-4} \text{ acyl}), N(C_{1-4} \text{$ 

alkyl)<sub>2</sub>, N(C<sub>1-18</sub> acyl)<sub>2</sub>, wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I), NO<sub>2</sub>, C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkynyl), C(O)O(C<sub>1-4</sub> alkenyl), O(C<sub>1-4</sub> acyl), O(C<sub>1-4</sub> alkyl), O(C<sub>1-4</sub> alkenyl), S(C<sub>1-4</sub> acyl), S(C<sub>1-4</sub> alkyl), S(C<sub>1-4</sub> alkynyl), S(C<sub>1-4</sub> alkenyl), SO(C<sub>1-4</sub> acyl), SO(C<sub>1-4</sub> alkyl), SO(C<sub>1-4</sub> alkynyl), SO(C<sub>1-4</sub> alkenyl), SO<sub>2</sub>(C<sub>1-4</sub> acyl), SO<sub>2</sub>(C<sub>1-4</sub> alkyl), SO<sub>2</sub>(C<sub>1-4</sub> alkynyl), SO<sub>2</sub>(C<sub>1-4</sub> alkenyl), O<sub>3</sub>S(C<sub>1-4</sub> acyl), O<sub>3</sub>S(C<sub>1-4</sub> alkyl), O<sub>3</sub>S(C<sub>1-4</sub> alkenyl), NH<sub>2</sub>, NH(C<sub>1-4</sub> alkyl), NH(C<sub>1-4</sub> alkyl), NH(C<sub>1-4</sub> alkyl), NH(C<sub>1-4</sub> acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2</sup> can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

#### 47. The method of claim 46,

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wherein Base is selected from the group consisting of:

Y is N or CH.

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as C=CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl.

48. The method of claim 46, wherein

Base is selected from the group consisting of (a) or (b):

and wherein  $R^1$  is H,  $R^2$  is OH,  $R^2$  is H,  $R^3$  is H, and  $R^4$  is NH<sub>2</sub> or OH, and  $R^5$  is NH<sub>2</sub>.

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49. A method for the treatment or prophylaxis of a rhinovirus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

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Base is selected from the group consisting of

Y is N or CH;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate;

R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2$  and  $R^2$  are independently H,  $C_{1-4}$  alkyl,  $C_{1-4}$  alkenyl,  $C_{1-4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I, NO<sub>2</sub>, C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> 4 alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  acyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$ alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl}), O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4})$ alkyl), NH( $C_{1-4}$  alkenyl), NH( $C_{1-4}$  alkynyl), NH( $C_{1-4}$  acyl), N( $C_{1-4}$ alkyl)2, N(C<sub>1-18</sub> acyl)2, wherein alkyl, alkynyl, alkenyl and vinyl are optimally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl}), SO_2(C_{1-4} \text{ alkynyl}), SO_2(C_{1-4} \text{ alkenyl}), O_3S(C_{1-4} \text{ acyl}),$  $O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4} \text{ alkyl}), NH(C_{1-4}$ alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$  alkyl)<sub>2</sub>,  $N(C_{1-4}$ acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2</sup> can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

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R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl;

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 $R^6$  is an optionally substituted alkyl (including lower alkyl), cyano (CN),  $CH_3$ ,  $OCH_3$ ,  $OCH_2CH_3$ , hydroxy methyl ( $CH_2OH$ ), fluoromethyl ( $CH_2F$ ), azido ( $N_3$ ), CHCN,  $CH_2N_3$ ,  $CH_2NH_2$ ,  $CH_2NHCH_3$ ,  $CH_2N(CH_3)_2$ , alkyne (optionally substituted), or fluoro;

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or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

### 50. The method of claim 49, wherein

Base is

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and  $R^1$  is  $H,\,R^2$  is OH,  $R^{2^{\ast}}$  is  $H,\,R^3$  is  $H,\,R^4$  is  $NH_2$  or OH, and  $R^6$  is H.

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51. A method for the treatment or prophylaxis of a rhinovirus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) or its pharmaceutically acceptable salt or prodrug thereof of the structure:

wherein Base is a purine or pyrimidine base;

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X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and,

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group and optionally a pharmaceutically acceptable carrier.

### 52. The method of claim 51, wherein

Base is selected from the group consisting of:

$$\mathbb{R}^4$$
 $\mathbb{R}^5$ 
 $\mathbb{R}^5$ 

Y is N or CH;

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R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl.

#### 53. The method of claim 51, wherein

Base is selected from the group consisting of (a) or (b):

and wherein  $R^1$  and  $R^7$  are H,  $R^3$  is H, and  $R^4$  is  $NH_2$  or OH, and  $R^5$  is  $NH_2$ .

54. A method for the treatment or prophylaxis of a rhinovirus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

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Base is

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

R<sup>2</sup> and R<sup>2</sup> are independently H, C<sub>1-4</sub> alkyl, C<sub>1-4</sub> alkenyl, C<sub>1-4</sub> alkynyl, vinyl, N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>, C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$ 4 alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  acyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$ alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl}), O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4})$ alkyl),  $NH(C_{1-4}$  alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$ alkyl)2, N(C<sub>1-18</sub> acyl)2, wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_2$  C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl}), SO_2(C_{1-4} \text{ alkynyl}), SO_2(C_{1-4} \text{ alkenyl}), O_3S(C_{1-4} \text{ acyl}),$  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkyl})$ alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$  alkyl)<sub>2</sub>,  $N(C_{1-4}$ acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2'</sup> can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

R<sup>3</sup> and R<sup>4</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ -

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 $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl;

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

55. A method for the treatment or prophylaxis of a rhinovirus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

15 wherein

Base is

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including

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optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group;

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R<sup>3</sup> and R<sup>4</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

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R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl;

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or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

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56. A method for the treatment or prophylaxis of a rhinovirus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

optionally in a pharmaceutically acceptable carrier.

57. A method for the treatment or prophylaxis of a rhinovirus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

wherein

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of

providing a compound wherein  $R^1$  or  $R^7$  is independently H or phosphate;  $R^1$  and  $R^7$  can also be linked with cyclic phosphate group; and,

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro; and

optionally in a pharmaceutically acceptable carrier.

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58. A method for the treatment or prophylaxis of a rhinovirus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

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optionally in a pharmaceutically acceptable carrier.

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59. A method for the treatment or prophylaxis of a rhinovirus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

wherein

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and

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R<sup>1</sup> is H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate;

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vivo is capable of providing a compound

optionally in a pharmaceutically acceptable carrier.

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60. A method for the treatment or prophylaxis of a rhinovirus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

$$HO \longrightarrow CH_3$$

optionally in a pharmaceutically acceptable carrier.

61. A method for the treatment or prophylaxis of a yellow fever virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other

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pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein  $R^1$  is H or phosphate;  $R^2$  is H or phosphate;  $R^1$  and  $R^2$  or  $R^7$  can also be linked with cyclic phosphate group;

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 $R^2$  and  $R^{2'}$  are independently H,  $C_{1\text{-}4}$  alkyl,  $C_{1\text{-}4}$  alkenyl,  $C_{1\text{-}4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I, NO<sub>2</sub> C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$ 4 alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  acyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$ alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl}), O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4} \text{ alkenyl})$ alkyl), NH( $C_{1-4}$  alkenyl), NH( $C_{1-4}$  alkynyl), NH( $C_{1-4}$  acyl), N( $C_{1-4}$ alkyl)<sub>2</sub>, N(C<sub>1-18</sub> acyl)<sub>2</sub>, wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_2$  C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl}), SO_2(C_{1-4} \text{ alkynyl}), SO_2(C_{1-4} \text{ alkenyl}), O_3S(C_{1-4} \text{ acyl}),$  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkyl})$ alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$  alkyl)<sub>2</sub>,  $N(C_{1-4}$ acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2</sup> can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

### 62. The method of claim 61,

wherein Base is selected from the group consisting of:

Y is N or CH.

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

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# 63. The method of claim 61, wherein

Base is selected from the group consisting of (a) or (b):

and wherein  $R^1$  is H,  $R^2$  is OH,  $R^2$  is H,  $R^3$  is H, and  $R^4$  is NH $_2$  or OH, and  $R^5$  is NH $_2$ .

64. A method for the treatment or prophylaxis of a yellow fever virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

Base is selected from the group consisting of

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#### Y is N or CH;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

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R<sup>2</sup> and R<sup>2</sup> are independently H, C<sub>1-4</sub> alkyl, C<sub>1-4</sub> alkenyl, C<sub>1-4</sub> alkynyl, vinyl, N<sub>3</sub>, CN, Cl, Br, F, I,  $NO_{2}$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$ 4 alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  acyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$ alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkenyl})$ alkyl),  $NH(C_{1-4}$  alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$ alkyl)<sub>2</sub>, N(C<sub>1-18</sub> acyl)<sub>2</sub>, wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_{1-4} \text{ alkenyl})$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkyl})$  alkenyl), NH( $C_{1-4}$  alkynyl), NH( $C_{1-4}$  acyl), N( $C_{1-4}$  alkyl)<sub>2</sub>, N( $C_{1-4}$  acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2</sup> can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl;

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof. optionally in a pharmaceutically acceptable carrier.

65. The method of claim 64, wherein

Base is

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and  $R^1$  is H,  $R^2$  is OH,  $R^2$  is H,  $R^3$  is H,  $R^4$  is NH $_2$  or OH, and  $R^6$  is H.

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66. A method for the treatment or prophylaxis of a yellow fever virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) or its pharmaceutically acceptable salt or prodrug thereof of the structure:

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wherein Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and,

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diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally

substituted, a lipid, including a phospholipid, an L or D-amino acid, a

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate,

carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein  $R^1$  or  $R^7$  is independently H or phosphate;  $R^1$  and  $R^7$  can also be linked with cyclic phosphate group and

optionally in a pharmaceutically acceptable carrier.

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### 67. The method of claim 66, wherein

Base is selected from the group consisting of:

Y is N or CH;

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-

 $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

### 68. The method of claim 66, wherein

Base is selected from the group consisting of (a) or (b):

and wherein  $R^1$  and  $R^7$  are H,  $R^3$  is H, and  $R^4$  is  $NH_2$  or OH, and  $R^5$  is  $NH_2$ .

69. A method for the treatment or prophylaxis of a yellow fever virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

Base is

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X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2 \text{ and } R^2 \text{ are independently H, } C_{1-4} \text{ alkyl, } C_{1-4} \text{ alkenyl, } C_{1-4} \text{ alkynyl, vinyl, } N_3, \\ CN, Cl, Br, F, I, NO_2, C(O)O(C_{1-4} \text{ alkyl), } C(O)O(C_{1-4} \text{ alkyl), } C(O)O(C_{1-4} \text{ alkyl), } C(O)O(C_{1-4} \text{ alkyl), } C(O)O(C_{1-4} \text{ alkynyl), } C(O)O(C_{1-4} \text{ alkenyl), } O(C_{1-4} \text{ alkynyl), } O(C_{1-4} \text{ alkynyl), } O(C_{1-4} \text{ alkenyl), } O(C_{1-4} \text{ alkenyl), } O(C_{1-4} \text{ alkynyl), } O(C_{1-4} \text{ alkenyl), } O(C_{1-4} \text{ alkenyl}), \\ O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), \\ O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), \\ O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ alkenyl}), \\ O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), \\ O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), \\ O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), \\ O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), \\ O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), \\ O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), \\ O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), \\ O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), \\ O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), \\ O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), \\ O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ al$ 

 $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkynyl})$ ,  $NH(C_{1-4} \text{ alkynyl})$ ,  $NH(C_{1-4} \text{ acyl})$ ,  $N(C_{1-4} \text{ alkyl})_2$ ,  $N(C_{1-4} \text{ acyl})_2$ ,  $OR^7$ ;  $R^2$  and  $R^2$  can be linked together to form a vinyl optionally substituted by one or two of  $N_3$ , CN, Cl, Br, F, I,  $NO_2$ ;

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R<sup>3</sup> and R<sup>4</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

70. A method for the treatment or prophylaxis of a yellow fever virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

Base is

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group;

R<sup>3</sup> and R<sup>4</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub>

such as C=CH, halogenated (F, Cl, Br, I) lower alkynyl of  $C_2$ - $C_6$ , lower alkoxy of  $C_1$ - $C_6$  such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of  $C_1$ - $C_6$ , CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

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R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl;

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or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

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71. A method for the treatment or prophylaxis of a yellow fever virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

optionally in a pharmaceutically acceptable carrier.

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72. A method for the treatment or prophylaxis of a yellow fever virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

$$R^{1}O$$
 $R^{6}$ 
 $R^{7}O$ 
 $E$ 
 $CH_{3}$ 
 $CH_{3}$ 

wherein

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group; and,

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro, and

optionally in a pharmaceutically acceptable carrier.

73. A method for the treatment or prophylaxis of a yellow fever virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-

fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

optionally in a pharmaceutically acceptable carrier.

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74. A method for the treatment or prophylaxis of a yellow fever virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

$$R^{1}O$$
 $X$ 
 $CH_{3}$ 
 $CH_{3}$ 

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wherein

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and

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R<sup>1</sup> is H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl

sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate;

optionally in a pharmaceutically acceptable carrier

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75. A method for the treatment or prophylaxis of a yellow fever virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

$$HO \longrightarrow CH_3$$

optionally in a pharmaceutically acceptable carrier.

76. A method for the treatment or prophylaxis of a West Nile virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2 \text{ and } R^2 \text{ are independently H, } C_{1-4} \text{ alkyl, } C_{1-4} \text{ alkenyl, } C_{1-4} \text{ alkynyl, vinyl, } N_3, \\ CN, Cl, Br, F, I, NO_2, C(O)O(C_{1-4} \text{ alkyl)}, C(O)O(C_{1-4} \text{ alkyl}), C(O)O(C_{1-4} \text{ alkyl}), C(O)O(C_{1-4} \text{ alkyl}), C(O)O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkynyl}), S(C_{1-4} \text{ alkenyl}), SO(C_{1-4} \text{ alkyl}), SO(C_{1-4} \text{ alkynyl}), SO(C_{1-4} \text{ alkenyl}), SO_2(C_{1-4} \text{ alkyl}), SO_2(C_{1-4} \text{ alkynyl}), SO_2(C_{1-4} \text{ alkenyl}), O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkynyl}), O_3S(C_{1-4} \text{ alkenyl}), O_3S(C_{1-4} \text{ alkenyl}), O_3S(C_{1-4} \text{ alkenyl}), O_3S(C_{1-4} \text{ alkynyl}), O_3S(C_{1-4} \text{ alkynyl})$ 

 $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkynyl})$ ,  $NH(C_{1-4} \text{ acyl})$ ,  $N(C_{1-4} \text{ alkyl})_2$ ,  $N(C_{1-4} \text{ acyl})_2$ ,  $OR^7$ ;  $R^2$  and  $R^2$  can be linked together to form a vinyl optionally substituted by one or two of  $N_3$ , CN, Cl, Br, F, I,  $NO_2$ ;

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

#### 77. The method of claim 76,

wherein Base is selected from the group consisting of:

Y is N or CH.

 $R^3$ ,  $R^4$  and  $R^5$  are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C=CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>,

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lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

### 78. The method of claim 76, wherein

Base is selected from the group consisting of (a) or (b):

and wherein R<sup>1</sup> is H, R<sup>2</sup> is OH, R<sup>2</sup> is H, R<sup>3</sup> is H, and R<sup>4</sup> is NH<sub>2</sub> or OH, and R<sup>5</sup> is NH<sub>2</sub>.

79. A method for the treatment or prophylaxis of a West Nile virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D) of the formula:

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#### wherein

Base is selected from the group consisting of

Y is N or CH;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2 \text{ and } R^{2'} \text{ are independently H, $C_{1-4}$ alkyl, $C_{1-4}$ alkenyl, $C_{1-4}$ alkynyl, vinyl, $N_3$, $CN, $Cl, $Br, $F, $I, $NO_2$, $C(O)O(C_{1-4}$ alkyl), $C(O)O(C_{1-4}$ alkyl), $C(O)O(C_{1-4}$ alkyl), $O(C_{1-4}$ alkyl), $O(C_{1-4}$ alkyl), $O(C_{1-4}$ alkyl), $O(C_{1-4}$ alkyl), $O(C_{1-4}$ alkynyl), $S(C_{1-4}$ alkenyl), $S(C_{1-4}$ alkyl), $SO(C_{1-4}$ alkyl), $SO(C_{1-4}$ alkyl), $SO(C_{1-4}$ alkyl), $SO(C_{1-4}$ alkyl), $SO_2(C_{1-4}$ alkyl), $SO_2(C_{1-4}$ alkyl), $O_3S(C_{1-4}$ alkyl), $O_3S(C_{1-4}$ alkyl), $O_3S(C_{1-4}$ alkyl), $O_4S(C_{1-4}$ 

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alkyl), NH(C<sub>1-4</sub> alkenyl), NH(C<sub>1-4</sub> alkynyl), NH(C<sub>1-4</sub> acyl), N(C<sub>1-4</sub> alkyl)<sub>2</sub>, N(C<sub>1-18</sub> acyl)<sub>2</sub>, wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I), NO<sub>2</sub>, C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkynyl), C(O)O(C<sub>1-4</sub> alkenyl), O(C<sub>1-4</sub> alkyl), O(C<sub>1-4</sub> alkenyl), S(C<sub>1-4</sub> acyl), S(C<sub>1-4</sub> alkyl), S(C<sub>1-4</sub> alkyl), S(C<sub>1-4</sub> alkyl), SO(C<sub>1-4</sub> alkyl), SO(C<sub>1-4</sub> alkynyl), SO(C<sub>1-4</sub> alkenyl), SO<sub>2</sub>(C<sub>1-4</sub> acyl), SO<sub>2</sub>(C<sub>1-4</sub> alkyl), SO<sub>2</sub>(C<sub>1-4</sub> alkynyl), SO<sub>2</sub>(C<sub>1-4</sub> alkenyl), O<sub>3</sub>S(C<sub>1-4</sub> acyl), O<sub>3</sub>S(C<sub>1-4</sub> alkyl), O<sub>3</sub>S(C<sub>1-4</sub> alkenyl), NH<sub>2</sub>, NH(C<sub>1-4</sub> alkyl), NH(C<sub>1-4</sub> alkyl), NH(C<sub>1-4</sub> alkyl), NH(C<sub>1-4</sub> alkyl)<sub>2</sub>, N(C<sub>1-4</sub> acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2</sup> can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

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R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

- R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl;
- R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

80. The method of claim 79, wherein

Base is

and  $R^1$  is H,  $R^2$  is OH,  $R^{2^{\prime}}$  is H,  $R^3$  is H,  $R^4$  is NH2 or OH, and  $R^6$  is H.

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81. A method for the treatment or prophylaxis of a West Nile virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) or its pharmaceutically acceptable salt or prodrug thereof of the structure:

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wherein Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and,

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-

phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group, and optionally a pharmaceutically acceptable carrier.

#### 82. The method of claim 81, wherein

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Base is selected from the group consisting of:

Y is N or CH;

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated

(F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

### 83. The method of claim 81, wherein

Base is selected from the group consisting of (a) or (b):

$$\begin{array}{c} R^4 \\ N \\ N \\ N \end{array}$$

$$\begin{array}{c} R^3 \\ N \\ N \end{array}$$

$$\begin{array}{c} R^4 \\ N \\ N \end{array}$$

$$\begin{array}{c} R^4 \\ N \\ N \end{array}$$

$$\begin{array}{c} R^4 \\ N \\ N \end{array}$$

$$\begin{array}{c} R^5 \\ N \\ N \end{array}$$

and wherein  $R^1$  and  $R^7$  are H,  $R^3$  is H, and  $R^4$  is  $NH_2$  or OH, and  $R^5$  is  $NH_2$ .

84. A method for the treatment or prophylaxis of a West Nile virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

$$R^{1}O$$
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{2}$ 
 $R^{3}$ 

wherein

Base is

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X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic

 $R^2$  and  $R^{2'}$  are independently H,  $C_{1\cdot4}$  alkyl,  $C_{1\cdot4}$  alkenyl,  $C_{1\cdot4}$  alkynyl, vinyl,  $N_3$ ,  $CN,\,Cl,\,Br,\,F,\,I,\,NO_2,\,C(O)O(C_{1\cdot4}$  alkyl),  $C(O)O(C_{1\cdot4}$  alkyl),  $C(O)O(C_{1\cdot4}$  alkyl),  $C(O)O(C_{1\cdot4}$  alkyl),  $O(C_{1\cdot4}$  alkynyl),  $O(C_{1\cdot4}$  alkenyl),  $O(C_{1\cdot4}$  alkyl),  $O(C_{1\cdot4}$  alkyl),  $O(C_{1\cdot4}$  alkynyl),  $O(C_{1\cdot4}$  al

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phosphate group;

NO<sub>2</sub>, C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkynyl), C(O)O(C<sub>1-4</sub> alkenyl), O(C<sub>1-4</sub> acyl), O(C<sub>1-4</sub> alkyl), O(C<sub>1-4</sub> alkenyl), S(C<sub>1-4</sub> acyl), S(C<sub>1-4</sub> alkyl), S(C<sub>1-4</sub> alkynyl), S(C<sub>1-4</sub> alkenyl), SO(C<sub>1-4</sub> acyl), SO(C<sub>1-4</sub> alkyl), SO(C<sub>1-4</sub> alkynyl), SO(C<sub>1-4</sub> alkenyl), SO<sub>2</sub>(C<sub>1-4</sub> acyl), SO<sub>2</sub>(C<sub>1-4</sub> alkyl), SO<sub>2</sub>(C<sub>1-4</sub> alkynyl), SO<sub>2</sub>(C<sub>1-4</sub> alkenyl), O<sub>3</sub>S(C<sub>1-4</sub> acyl), O<sub>3</sub>S(C<sub>1-4</sub> alkyl), O<sub>3</sub>S(C<sub>1-4</sub> alkenyl), NH<sub>2</sub>, NH(C<sub>1-4</sub> alkyl), NH(C<sub>1-4</sub> alkyl), NH(C<sub>1-4</sub> alkyl), NH(C<sub>1-4</sub> acyl), N(C<sub>1-4</sub> acyl)<sub>2</sub>, OR<sup>7</sup>; R<sup>2</sup> and R<sup>2</sup> can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

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R<sup>3</sup> and R<sup>4</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl.

 $R^6$  is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

85. A method for the treatment or prophylaxis of a West Nile virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

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wherein

Base is

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diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate,

 $R^3$  and  $R^4$  are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I)

lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

86. A method for the treatment or prophylaxis of a West Nile virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

optionally in a pharmaceutically acceptable carrier.

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87. A method for the treatment or prophylaxis of a West Nile virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

wherein

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R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group; and.

 $R^6$  is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro and,

optionally in a pharmaceutically acceptable carrier.

88. A method for the treatment or prophylaxis of a West Nile virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

and optionally a pharmaceutically acceptable carrier.

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89. A method for the treatment or prophylaxis of a West Nile virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

wherein

X is O, S,  $CH_2$ , Se, NH, N-alkyl, CHW (R, S, or racemic),  $C(W)_2$ , wherein W is F, Cl, Br, or I; and

R<sup>1</sup> is H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-

phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate;

optionally in a pharmaceutically acceptable carrier.

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90. A method for the treatment or prophylaxis of a West Nile virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

$$HO \longrightarrow CH_3$$

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optionally in a pharmaceutically acceptable carrier.

91. A method for the treatment or prophylaxis of a Dengue virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

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Base is a purine or pyrimidine base;

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2$  and  $R^{2'}$  are independently H,  $C_{1-4}$  alkyl,  $C_{1-4}$  alkenyl,  $C_{1-4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I,  $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$  alkynyl),  $O(C_{1-4}$ 

 $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH(C_{1-4} \text{ acyl})$ ,  $N(C_{1-4} \text{ alkyl})_2$ ,  $N(C_{1-18} \text{ acyl})_2$ , wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by  $N_3$ , CN, one to three halogen (Cl, Cl, Cl) Cl, Cl

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

#### 92. The method of claim 91,

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wherein Base is selected from the group consisting of:

Y is N or CH.

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R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

#### 93. The method of claim 91, wherein

Base is selected from the group consisting of (a) or (b):

and wherein  $R^1$  is H,  $R^2$  is OH,  $R^2$  is H,  $R^3$  is H, and  $R^4$  is NH<sub>2</sub> or OH, and  $R^5$  is NH<sub>2</sub>.

94. A method for the treatment or prophylaxis of a Dengue virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D) of the formula:

wherein

Base is selected from the group consisting of

Y is N or CH;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate;

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R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2$  and  $R^{2'}$  are independently H,  $C_{1\text{-}4}$  alkyl,  $C_{1\text{-}4}$  alkenyl,  $C_{1\text{-}4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I, NO<sub>2</sub>, C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1-4</sub> alkyl), C(O)O(C<sub>1</sub>-4 4 alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  acyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$ alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl}), O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4})$ alkyl),  $NH(C_{1-4}$  alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$ alkyl)2, N(C<sub>1-18</sub> acyl)2, wherein alkyl, alkynyl, alkenyl and vinyl are optimally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_1$ 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} \text{ acyl})$ ,  $O_3S(C_{1-4} \text{ alkyl})$ ,  $O_3S(C_{1-4} \text{ alkenyl})$ ,  $NH_2$ ,  $NH(C_{1-4} \text{ alkyl})$ ,  $NH(C_{1-4} \text{ alkyl})$ alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$  alkyl)<sub>2</sub>,  $N(C_{1-4}$ acyl)2, OR7; R2 and R2 can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

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R' is an optionally substituted alkyl of C<sub>1</sub>-C<sub>12</sub> (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of C<sub>2</sub>-C<sub>6</sub>, optionally substituted lower alkenyl of C<sub>2</sub>-C<sub>6</sub>, or optionally substituted acyl;

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 $R^6$  is an optionally substituted alkyl (including lower alkyl), cyano (CN),  $CH_3$ ,  $OCH_3$ ,  $OCH_2CH_3$ , hydroxy methyl ( $CH_2OH$ ), fluoromethyl ( $CH_2F$ ), azido ( $N_3$ ), CHCN,  $CH_2N_3$ ,  $CH_2NH_2$ ,  $CH_2NHCH_3$ ,  $CH_2N(CH_3)_2$ , alkyne (optionally substituted), or fluoro;

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or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

## 95. The method of claim 94, wherein

Base is

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and  $R^1$  is H,  $R^2$  is OH,  $R^{2^{\prime}}$  is H,  $R^3$  is H,  $R^4$  is NH $_2$  or OH, and  $R^6$  is H.

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96. A method for the treatment or prophylaxis of a Dengue virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) or its pharmaceutically acceptable salt or prodrug thereof of the structure:

wherein Base is a purine or pyrimidine base;

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X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and,

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group, and optionally a pharmaceutically acceptable carrier.

# 97. The method of claim 96, wherein

Base is selected from the group consisting of:

$$\mathbb{R}^{3}$$
 $\mathbb{R}^{4}$ 
 $\mathbb{R}^{5}$ 

Y is N or CH;

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R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

#### 98. The method of claim 96, wherein

Base is selected from the group consisting of (a) or (b):

and wherein  $R^1$  and  $R^7$  are H,  $R^3$  is H, and  $R^4$  is  $NH_2$  or OH, and  $R^5$  is  $NH_2$ .

99. A method for the treatment or prophylaxis of a Dengue virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

wherein

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Base is

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I;

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid (or racemic mixture), a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> is H or phosphate; R<sup>2</sup> is H or phosphate; R<sup>1</sup> and R<sup>2</sup> or R<sup>7</sup> can also be linked with cyclic phosphate group;

 $R^2$  and  $R^2$  are independently H,  $C_{1-4}$  alkyl,  $C_{1-4}$  alkenyl,  $C_{1-4}$  alkynyl, vinyl,  $N_3$ , CN, Cl, Br, F, I, NO<sub>2</sub>, C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$  alkyl), C(O)O( $C_{1-4}$ 4 alkynyl),  $C(O)O(C_{1-4}$  alkenyl),  $O(C_{1-4}$  acyl),  $O(C_{1-4}$  alkyl),  $O(C_{1-4}$ alkenyl),  $S(C_{1-4} \text{ acyl})$ ,  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl})$ ,  $SO_2(C_{1-4} \text{ alkynyl})$ ,  $SO_2(C_{1-4} \text{ alkenyl})$ ,  $O_3S(C_{1-4} - acyl)$ ,  $O_3S(C_{1-4} - alkyl)$ ,  $O_3S(C_{1-4} - alkenyl)$ ,  $NH_2$ ,  $NH(C_{1-4} - alkyl)$ alkyl),  $NH(C_{1-4}$  alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$ alkyl)2, N(C1-18 acyl)2, wherein alkyl, alkynyl, alkenyl and vinyl are optinally substituted by N<sub>3</sub>, CN, one to three halogen (Cl, Br, F, I),  $NO_2$ ,  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkyl),  $C(O)O(C_{1-4}$  alkynyl),  $C(O)O(C_{1-4} \text{ alkenyl}), O(C_{1-4} \text{ acyl}), O(C_{1-4} \text{ alkyl}), O(C_{1-4} \text{ alkenyl}), S(C_1$ . 4 acyl),  $S(C_{1-4} \text{ alkyl})$ ,  $S(C_{1-4} \text{ alkynyl})$ ,  $S(C_{1-4} \text{ alkenyl})$ ,  $SO(C_{1-4} \text{ acyl})$ ,  $SO(C_{1-4} \text{ alkyl})$ ,  $SO(C_{1-4} \text{ alkynyl})$ ,  $SO(C_{1-4} \text{ alkenyl})$ ,  $SO_2(C_{1-4} \text{ acyl})$ ,  $SO_2(C_{1-4} \text{ alkyl}), SO_2(C_{1-4} \text{ alkynyl}), SO_2(C_{1-4} \text{ alkenyl}), O_3S(C_{1-4} \text{ acyl}),$  $O_3S(C_{1-4} \text{ alkyl}), O_3S(C_{1-4} \text{ alkenyl}), NH_2, NH(C_{1-4} \text{ alkyl}), NH(C_{1-4}$ alkenyl),  $NH(C_{1-4}$  alkynyl),  $NH(C_{1-4}$  acyl),  $N(C_{1-4}$  alkyl)<sub>2</sub>,  $N(C_{1-4}$ acyl)2, OR7; R2 and R2 can be linked together to form a vinyl optionally substituted by one or two of N<sub>3</sub>, CN, Cl, Br, F, I, NO<sub>2</sub>;

R<sup>3</sup> and R<sup>4</sup> are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C≡CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R'; and,

R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ -

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 $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted acyl.

R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro;

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

100. A method for the treatment or prophylaxis of a Dengue virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L) of the formula:

15 wherein

Base is

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including

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optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein R<sup>1</sup> or R<sup>7</sup> is independently H or phosphate; R<sup>1</sup> and R<sup>7</sup> can also be linked with cyclic phosphate group;

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 $R^3$  and  $R^4$  are independently H, halogen including F, Cl, Br, I, OH, OR', SH, SR', NH<sub>2</sub>, NHR', NR'<sub>2</sub>, lower alkyl of C<sub>1</sub>-C<sub>6</sub>, halogenated (F, Cl, Br, I) lower alkyl of C<sub>1</sub>-C<sub>6</sub> such as CF<sub>3</sub> and CH<sub>2</sub>CH<sub>2</sub>F, lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CH<sub>2</sub>, halogenated (F, Cl, Br, I) lower alkenyl of C<sub>2</sub>-C<sub>6</sub> such as CH=CHCl, CH=CHBr and CH=CHI, lower alkynyl of C<sub>2</sub>-C<sub>6</sub> such as C=CH, halogenated (F, Cl, Br, I) lower alkynyl of C<sub>2</sub>-C<sub>6</sub>, lower alkoxy of C<sub>1</sub>-C<sub>6</sub> such as CH<sub>2</sub>OH and CH<sub>2</sub>CH<sub>2</sub>OH, halogenated (F, Cl, Br, I) lower alkoxy of C<sub>1</sub>-C<sub>6</sub>, CO<sub>2</sub>H, CO<sub>2</sub>R', CONH<sub>2</sub>, CONHR', CONR'<sub>2</sub>, CH=CHCO<sub>2</sub>H, CH=CHCO<sub>2</sub>R';

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R' is an optionally substituted alkyl of  $C_1$ - $C_{12}$  (particularly when the alkyl is an amino acid residue), cycloalkyl, optionally substituted alkynyl of  $C_2$ - $C_6$ , optionally substituted lower alkenyl of  $C_2$ - $C_6$ , or optionally substituted

acyl.

or its pharmaceutically acceptable salt or prodrug thereof, optionally in a pharmaceutically acceptable carrier.

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101. A method for the treatment or prophylaxis of a Dengue virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

optionally in a pharmaceutically acceptable carrier.

102. A method for the treatment or prophylaxis of a Dengue virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

$$R^{1}O$$
 $R^{6}$ 
 $R^{7}O$ 
 $E$ 
 $CH_{3}$ 

wherein

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diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized H-phosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically

R<sup>1</sup> and R<sup>7</sup> are independently H, phosphate, including monophosphate,

acceptable leaving group which when administered *in vivo* is capable of providing a compound wherein  $R^1$  or  $R^7$  is independently H or phosphate;  $R^1$  and  $R^7$  can also be linked with cyclic phosphate group; and,

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R<sup>6</sup> is an optionally substituted alkyl (including lower alkyl), cyano (CN), CH<sub>3</sub>, OCH<sub>3</sub>, OCH<sub>2</sub>CH<sub>3</sub>, hydroxy methyl (CH<sub>2</sub>OH), fluoromethyl (CH<sub>2</sub>F), azido (N<sub>3</sub>), CHCN, CH<sub>2</sub>N<sub>3</sub>, CH<sub>2</sub>NH<sub>2</sub>, CH<sub>2</sub>NHCH<sub>3</sub>, CH<sub>2</sub>N(CH<sub>3</sub>)<sub>2</sub>, alkyne (optionally substituted), or fluoro and,

optionally in a pharmaceutically acceptable carrier.

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103. A method for the treatment or prophylaxis of a Dengue virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

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and optionally a pharmaceutically acceptable carrier.

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104. A method for the treatment or prophylaxis of a Dengue virus infection comprising administering to a host an antivirally effective amount of a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

wherein

X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and

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R<sup>1</sup> is H, phosphate, including monophosphate, diphosphate, triphosphate, or a stabilized phosphate prodrug, H-phosphonate, including stabilized Hphosphonates, acyl, including optionally substituted phenyl and lower acyl, alkyl, including lower alkyl, O-substituted carboxyalkylamino or its peptide derivatives, sulfonate ester, including alkyl or arylalkyl sulfonyl, including methanesulfonyl and benzyl, wherein the phenyl group is optionally substituted, a lipid, including a phospholipid, an L or D-amino acid, a carbohydrate, a peptide, a cholesterol, or other pharmaceutically acceptable leaving group which when administered in vivo is capable of providing a compound wherein R<sup>1</sup> is H or phosphate;

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optionally in a pharmaceutically acceptable carrier.

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105. A method for the treatment or prophylaxis of a Dengue virus infection comprising administering to a host an antivirally effective amount of a (2'R)-2'-deoxy-2'fluoro-2'-C-methyl nucleoside (β-D) or its pharmaceutically acceptable salt or prodrug thereof of the formula:

optionally in a pharmaceutically acceptable carrier.

106. The method of 31, wherein the antivirally effective amount of (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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107. The method of 41, wherein the antivirally effective amount of (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin;

interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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- The method of 43, wherein the antivirally effective amount of (2'R)-2'-deoxy-108. 2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.
- 109. The method of 45, wherein the antivirally effective amount of (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a,

interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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110. The method of 46, wherein the antivirally effective amount of (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

The method of 56, wherein the antivirally effective amount of (2'R)-2'-deoxy-111. 2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic

vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

113. The method of 60, wherein the antivirally effective amount of (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene;

amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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The method of 71, wherein the antivirally effective amount of (2'R)-2'-deoxy-115. 2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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116. The method of 73, wherein the antivirally effective amount of (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine

derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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- 117. The method of 75, wherein the antivirally effective amount of (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.
- 118. The method of 76, wherein the antivirally effective amount of (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase

inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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The method of 86, wherein the antivirally effective amount of (2'R)-2'-deoxy-119. 2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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120. The method of 88, wherein the antivirally effective amount of (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin;

interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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- The method of 90, wherein the antivirally effective amount of (2'R)-2'-deoxy-121. 2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.
- 122. The method of 91, wherein the antivirally effective amount of (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a,

interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine; a bile acid; N-(phosphonoacetyl)-L-aspartic acid; a benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

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123. The method of 101, wherein the antivirally effective amount of (2'R)-2'deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; bile amantadine; acid; N-(phosphonoacetyl)-L-aspartic acid: benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybinphosphatidylcholine phytosome; and mycophenolate.

124. The method of 103, wherein the antivirally effective amount of (2'R)-2'deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; amantadine; bile acid; N-(phosphonoacetyl)-L-aspartic acid: squalene; benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybinphosphatidylcholine phytosome; and mycophenolate.

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125. The method of 105, wherein the antivirally effective amount of (2'R)-2'deoxy-2'-fluoro-2'-C-methyl nucleoside is administered in combination or alternation with at least one treatment selected from the group consisting of: interferon, including interferon alpha 2a, interferon alpha 2b, a pegylated interferon, interferon beta, interferon gamma, interferon tau and interferon omega; an interleukin, including interleukin 10 and interleukin 12; ribavirin; interferon alpha or pegylated interferon alpha in combination with ribavirin or levovirin; levovirin; a protease inhibitor including an NS3 inhibitor, a NS3-4A inhibitor; a helicase inhibitor; a polymerase inhibitor including HCV RNA polymerase and NS5B polymerase inhibitor; gliotoxin; an IRES inhibitor; and antisense oligonucleotide; a thiazolidine derivative; a benzanilide, a ribozyme; another nucleoside, nucleoside prodrug or nucleoside derivative; a 1-amino-alkylcyclohexane; an antioxidant including vitamin E; squalene; amantadine: bile acid: N-(phosphonoacetyl)-L-aspartic benzenedicarboxamide; polyadenylic acid; a benzimidazoles; thymosin; a beta tubulin inhibitor; a prophylactic vaccine; an immune modulator, an IMPDH inhibitor; silybin-phosphatidylcholine phytosome; and mycophenolate.

126. A method of synthesizing a (2R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside  $(\beta$ -D or  $\beta$ -L) comprising glycosylation of a nucleobase with an intermediate structure:

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wherein R is lower alkyl, acyl, benzoyl, or mesyl; and Pg is any acceptable protecting group consisting of but not limited to C(O)-alkyl, C(O)Ph, C(O)aryl, CH<sub>3</sub>, CH<sub>2</sub>-alkyl, CH<sub>2</sub>-alkenyl, CH<sub>2</sub>Ph, CH<sub>2</sub>-aryl, CH<sub>2</sub>O-alkyl, CH<sub>2</sub>O-aryl, SO<sub>2</sub>-alkyl, SO<sub>2</sub>-aryl, *tert*-butyldimethylsilyl, *tert*-butyldiphenylsilyl, or both Pg's may come together to for a 1,3-(1,1,3,3-tetraisopropyldisiloxanylidene).

127. A method of synthesizing a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside
(β-D or β-L) comprising selective deprotection of either Pg in an intermediate of the structure:

wherein, X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (R, S, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and Pg is independently any pharmaceutically acceptable protecting group

selected from the group consisting of C(O)-alkyl, C(O)Ph, C(O)aryl, CH<sub>3</sub>, CH<sub>2</sub>-alkyl, CH<sub>2</sub>-alkyl, CH<sub>2</sub>-alkyl, CH<sub>2</sub>O-aryl, SO<sub>2</sub>-alkyl, SO<sub>2</sub>-aryl, *tert*-butyldimethylsilyl, *tert*-butyldiphenylsilyl, or both Pg's may come together to for a 1,3-(1,1,3,3-tetraisopropyldisiloxanylidene).

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128. An intermediate in the synthesis of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L), wherein the intermediate is of the structure:

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wherein R is lower alkyl, acyl, benzoyl, or mesyl; and Pg is any acceptable protecting group consisting of but not limited to C(O)-alkyl, C(O)Ph, C(O)aryl, CH<sub>3</sub>, CH<sub>2</sub>-alkyl, CH<sub>2</sub>-alkenyl, CH<sub>2</sub>Ph, CH<sub>2</sub>-aryl, CH<sub>2</sub>O-alkyl, CH<sub>2</sub>O-aryl, SO<sub>2</sub>-alkyl, SO<sub>2</sub>-aryl, *tert*-butyldimethylsilyl, *tert*-butyldiphenylsilyl, or both Pg's may come together to for a 1,3-(1,1,3,3-tetraisopropyldisiloxanylidene).

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129. An intermediate in the synthesis of a (2'R)-2'-deoxy-2'-fluoro-2'-C-methyl nucleoside ( $\beta$ -D or  $\beta$ -L), wherein the intermediate is of the structure:

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wherein, X is O, S, CH<sub>2</sub>, Se, NH, N-alkyl, CHW (*R*, *S*, or racemic), C(W)<sub>2</sub>, wherein W is F, Cl, Br, or I; and Pg is independently any pharmaceutically acceptable protecting group selected from the group consisting of C(O)-alkyl, C(O)Ph, C(O)aryl, CH<sub>3</sub>, CH<sub>2</sub>-alkyl, CH<sub>2</sub>-alkenyl, CH<sub>2</sub>Ph, CH<sub>2</sub>-aryl, CH<sub>2</sub>O-alkyl, CH<sub>2</sub>O-aryl, SO<sub>2</sub>-alkyl, SO<sub>2</sub>-aryl, *tert*-butyldimethylsilyl, *tert*-butyldiphenylsilyl, or both Pg's may come together to for a 1,3-(1,1,3,3-tetraisopropyldisiloxanylidene).